

## Economies of Producing Grower Pigs Fed Different Energy Based Agro By-Products

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### ARTICLE INFO

### ABSTRACT

#### Key words:

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*A six-week feeding trial was conducted to evaluate the economics of producing grower pigs fed different agro based energy sources. Thirty two (32) grower pigs (Large white and Landrace) were used. The experimental animals were randomly assigned to four dietary treatments (1,2,3 and 4) in a complete randomized design (CRD). Each treatment group contained four (4) replicate with two (2) pigs per replicate. In diet 1 (control), maize was the energy source while diets 2, 3 and 4 with palm kernel cake (PKM), brewer's dried grain (BDG) and wheat offal (WO) served as alternative energy sources respectively. The grower pigs had access to experimental feed and water ad libitum for six weeks. The cost benefit analysis revealed that the highest cost of feed per kg (₦) was recorded in the control maize diet with ₦386 while the least was in palm kernel meal (PKM) diet with ₦297. The total cost of production (₦/ pig) was also highest in the maize controlled diet with ₦32,578.4 while it was lowest (₦25,482.6) in dietary treatment 2 with palm kernel meal. The revenue/income (₦/ pig) was highest in diet 2 (PKM) followed by the wheat offal, maize BDG diets (₦54,360, ₦48,240, ₦47,880 and ₦43,920) respectively. The gross profit (₦/ pig) was also highest in the PKM diet followed by diet 4 (wheat offal), 3 (BDG) and least in treatment 1 (maize) with their correspondent monetary values as ₦28,877.4, ₦20,280.2, ₦15,881.4 and ₦15,301.6 respectively. In conclusion, palm kernel meal (PKM) is adjudged to be more economically viable and effective and could be used to replace maize wholly in diets of grower pigs without any negative side effect.*

## 1.0 Introduction

Nutrition is one of the major constraints to the survival and satisfactory productivity of man and his livestock in Africa and many parts of the world (Igene, 2022). He maintained that nutrition involves food supply for any type of internal and external uses. Generally, nutrition aims at providing all essential nutrients in adequate amounts and in optimum proportions. In the words of Igene (2022), he stated that nutrition is the scientific way food is used by human body, his livestock and other organisms. The need to increase livestock production as a way of making animal food nutrient available is very vital to humanity (Okoruwa *et al.*, 2011).

The demand for animal protein origin in Nigeria is far higher than the supply (Akinmutimi and Onukwe, 2012), hence there is an acute shortage of animal protein in the diets of many Nigerians. Access to adequate or good nutrition has become a very serious issue that neglecting it may put concerted efforts towards food security needs of the country into jeopardy. On the average, 10g of animal protein is consumed per day compared to the recommended 35g (FAO, 2018). This suggests that aggressive emphasis and action must be put in place to engender animal production to bridge the wide gap. For the pig industry to remain profitable, development of feeding strategies based on low cost feedstuff which are locally available to small farm holders remains

indispensable (Nelson *et al.*, 2007; Donkoh and Zanu, 2010). Alade *et al.* (2003), noted that the problem of food scarcity continue to persist with increasing population growth worldwide.

Agro industrial by-products from wheat and maize processing are increasingly becoming available mostly in urban centres of Nigeria. Sundu *et al.* (2006), reported that the search for least cost formulation has led animal nutritionists to probe the nutritional potentials of non-conventional feed ingredients used for compounding animal rations, and to ascertain the percentage (%) of combinations of such ingredients that could bring about satisfactory performance. In tackling the world's/Nigeria's food insecurity and by extension poverty alleviation, there must be an evolution in the feed strategy, compilation and a total deviation from the conventional approach. Igene (2022) noted that most of these agro by-products could be the rescue. Of all these agro by-products, palm kernel meal, brewer's dried grain and wheat offal are prominent base on the nutrient levels after extraction of the raw products.

## 2.0 Materials and Methods

### 2.1 Experimental Site, Ingredients and Duration

The experiment was conducted at the Piggery Unit of the Teaching and Research Farm of the Faculty of Agriculture, Ambrose Alli University, Ekpoma in Esan West Local Government Area of Edo State, Nigeria. The farm is located in the tropical savanna rainforest vegetation belt in Nigeria with Longitude 6.44°C North and 6.08°C East with mean ambient temperature of about 29°C and relative humidity of about 76%. All the feed (experimental) ingredients were purchased at JAPPER NIGERIA LIMITED and Animal Feed Shop, both in Benin City, Edo State. The experiment was carried out for period of six weeks.

### 2.2 Management of Experimental Animals and Design

A total of thirty two (32) crossbred Large white and Landrace grower pigs whose average weight was 20.8kg and aged ten (10) weeks were used for the experiment. The pigs were divided into four (4) groups based on their average initial weights and were accordingly allocated to each of the four treatment diets (1,2,3 and 4) in a complete randomized design (CRD). Each treatment group had eight (8) grower pigs with four (4) replicates of two (2) each (one male and one female).

Prior to the arrival and subsequent allocation of the experimental animals, the pens were thoroughly washed and disinfected. The surroundings were

cleared to ward off poisonous snakes and other predators. Acclimatization period of five days was allowed before the commencement of the feeding trial (experiment). While the experimental animals were fed twice daily (morning and evening), water was supplied *ad libitum* throughout the duration of the experiment. Routine vaccination, medication and other management practices were carried out.

### 2.3 Diet Formulation

The diets consisted of the following energy sources; maize, palm kernel meal (PKM), brewer's dried grain (BDG) and wheat offal (WO). Major protein source was groundnut cake (GNC) while other ingredients consisted of bone meal, vitamins/minerals premix, lysine, methionine and salt. Diet 1, which served as the control contained maize while diets 2, 3 and 4 had palm kernel meal, brewer's dried grain and wheat offal to replace maize as source of energy on weight equalization basis. Constant values were used in inclusion of other ingredients in the respective diets before mixing.

**Table 1: Composition of Experimental Diets**

Ingredients %	Diet 1 Maize	Diet 2 PKM	Diet 3 BDG	Diet 4 WO
Maize (control)	44.10	0.00	0.00	0.00
Palm Kernel Meal (PKM)	0.00	44.10	0.00	0.00
Brewer Dried Grain (BDG)	0.00	0.00	44.10	0.00
Wheat Offal (WO)	0.00	0.00	0.00	44.10
Cassava	29.60	29.60	29.60	29.60
Groundnut Cake (GNC)	20.00	20.00	20.00	20.00
Blood Meal	3.50	3.50	3.50	3.50
Bone Meal	2.00	2.00	2.00	2.00
Vit/Min Premix	0.25	0.25	0.25	0.25
Lysine	0.15	0.15	0.15	0.15
Methionine	0.15	0.15	0.15	0.15
Salt	0.25	0.25	0.25	0.25
<b>Total</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Calculated:</b>				
<b>Crude Protein (%)</b>	<b>21.40</b>	<b>22.97</b>	<b>22.79</b>	<b>21.12</b>
<b>Energy (Kcal/kg)</b>	<b>3062.24</b>	<b>2652.25</b>	<b>2648.02</b>	<b>2644.59</b>

### 2.4 Cost Benefit Analysis

The prices of the feed ingredients at the time of the experiment were used to calculate the cost benefit of the production namely; cost of feed per kilogram (₦), cost of feed per weight gain (₦), total production cost

per pig (₦), total revenue per pig (₦) and profit or loss per pig (₦) while the price of pork per kilogram was put at one thousand eight hundred naira (₦1,800).

### 3.0 Results

The economic position of producing growing pigs with the experimental diets is shown in Table 2. The Table explicitly revealed that the feed cost (₦) was highest in diet containing the experimental ingredients (maize) followed by treatment 4, 3 and 2 which had wheat offal (WO) brewer's dried grain (BDG) and palm kernel meal (PKM) as alternative to maize in the production of growing pigs. Their monetary values are; 386, 358, 333 and 297 (₦) respectively.

The total cost of feed consumed per pig which is also shown in Table 2 had 32,578.4, 28,038.6, 27,959.8 and 25,482.6 (₦) for diets 1, 3, 4 and 2 in that order. It is evident here that the maize based control diet had

**Table 2: Economies of Producing Growing Pigs as Influenced by the Treatment Diets.**

Parameters	Dietary Treatments			
	1 Maize	2 PKM	3 BDG	4 WO
Ave. initial weight /pig (kg)	20.8	21.4	20.6	20.4
Ave. final weight /pig (kg)	47.4	51.6	45.0	47.2
Ave. total weight /pig (kg)	26.6	30.2	24.4	26.8
Feed cost (₦/kg)	386	297	333	358
Total feed consumed /pig/kg	84.4	85.8	84.2	78.1
Total cost of feed consumed (₦)	32,578.4	25,482.6	28,038.6	27,959.8
Ave. cost of feed/kg live wt gain/pig(₦)	1,273.8	861.3	1,132.2	1,145.6
Revenue/total live weight gain (₦)	47,880.0	54,360.0	43,920.0	48,240.0
Gross profit (₦/pig)	15,301.6	28,877.4	15,881.4	20,280.2
Feed conversion ratio	3.30	2.90	3.40	3.20

### 3.1 Discussion

The economics of producing grower pig fed different energy based agro by-products revealed that palm kernel meal treatment diet (PKM) was the most cost effective. Feed cost (₦/kg), total cost of feed consumed (₦/ pig) and profit/pig (₦), feed conversion ratio among others were better in the PKM diet. Feed cost (₦/kg) was shown to be highest (₦386) in the maize controlled diet and least (₦297) in the palm kernel meal treatment diet. The total cost of feed consumed per pig was highest (₦32,578.4) in pigs in the control diet while it was observed to be lowest (₦25,482.6) in the PKM diet. The higher cost incurred in the maize diet could be as a result insufficiency of maize in the market, ban on importation of

the highest monetary implication in feeding grower pig followed by diets 3, 4 and 2 respectively. This may be traceable to highest cost of maize as a result of government ban on importation, very poor production due to insecurity and unavailability for animal consumption at the local level as a major dietary energy ingredient.

Feed conversion ratio ranged from 2.90 in dietary treatment 2 to 2.40 in diet 3. The revenue per total live weight gain ranged from 43,920 in diet 3 to 54,360 in diet 2 as indicated in Table 2 below. The Table also revealed that the highest revenue was in diet 2 which had palm kernel meal (PKM) as the alternative dietary energy source. In the same vein, the gross profit per pig (₦) was recorded highest in dietary treatment 2. The profits were put at 47,880, 54,360, 43,920 and 48,240 for diets 1,2,3 and 4 respectively.

agricultural products and pressure on the few available products.

Prices for palm kernel meal (PKM), brewer's dried grain (BDG) and wheat offal (WO) respectively were not the same. This corroborates the earlier reports of Iwegbu (2014) and Igene (2006) that PKM and BDG were relatively cheaper feed ingredients. The cost of feed/kg live weight gain was least (861.3) in the PKM treatment diet, BDG (1,132.2) and wheat offal (1145.6) while it was highest (1,273.8) in the control diet of maize. The low cost of feed/live weight gain observed in pigs in treatment 2 (PKM) translated to more revenue and profit in the animals given the diet. Thus, the palm kernel meal diet was the most efficient and cost effective. To buttress this, Table 2 revealed that the profit that accrued in the PKM diet was almost



twice the one of maize. It was also discovered that the profit on BDG and WO diets were higher than maize treated diet. This goes to say that apart from PKM; BDG and WO were more economically viable and effective than the control diet.

The replacement of maize with cassava meal up to 50% level in weaner pigs diet resulted in higher revenue and profit (Igene and Esobhawan, (2003). Ugwuene (2002) had also reported that replacement of whole maize with maize offal brewer's dried grain up to 50% resulted to higher profit. Alimon (2004) stated that there is improvement in the feed efficiency through accelerated use of local feed stuff to represent a potential area of application to reduce high cost in livestock feeding and production. Report on this research showed PKM as a high energy source and cost effective ingredient for growing pig ration formulation. It corroborates with the findings of the above authors and justifies the need for continuous search for alternative feed ingredients to replace the costlier and scarce conventional feed ingredients.

#### 4.0 Conclusion

The economic viability of the experimental energy based agro by-products showed that the cost of feed per kilogram and general cost of production was highest in maize based control diet while it least in palm kernel meal diet. Animals fed PKM diets had highest estimated revenue and profit for total live weight gain thus making PKM more viable economically.

#### 4.1 Findings

- i. Palm kernel meal is proven to be a better alternative to more expensive maize ingredients.
- ii. Substituting maize wholly with palm kernel meal in grower pig production has no adverse health implication.
- iii. Competition between human and animal (pigs) is grossly reduced when PKM is used to alternate maize in livestock production.

#### 4.2 Recommendations

The following recommendations could be made based on the findings of this research;

- i. Feed millers should be encouraged and educated on the use of palm kernel meal as an alternative to maize in feed compilation.
- ii. Palm kernel meal should be investigated as a replacement for maize in weaner and finisher pigs and also for other non-ruminant ration.
- iii. Hence findings of this research support economic viability of PKM, it is however

recommended that pig farmers adopt it as an alternative to maize.

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